

XLI.—*Evidence of the Occurrence of Pterosaurians and Plesiosaurians in the Cretaceous of Brazil, discovered by Joseph Mawson, Esq., F.G.S.* By A. SMITH WOODWARD, F.G.S.\*

THREE years ago the writer contributed to the 'Annals' † a series of brief notes on some vertebrate fossils from the Province of Bahia, Brazil, collected and presented to the British Museum by Joseph Mawson, Esq., F.G.S., of the Brazilian Central Railway. To the continued investigations of the same generous donor the Museum is now indebted for three additional series of specimens, partly referable to the types already discovered, and partly adding to the known fauna. All are more or less fragmentary, but the fossils in the latter category are of interest as foreshadowing some of the discoveries that may eventually be expected from the Brazilian Cretaceous formation; and three of the bones capable of ordinal determination extend so considerably the known range of two extinct Reptilian groups, that they seem worthy of being placed on record at once. Two of these bones are examples of the articular end of a large Pterosaurian quadrate; the third fossil is a Plesiosaurian propodial bone. Each of the three specimens was met with in the Cretaceous shale on the coast near Bahia, from which Mr. Mawson has already obtained so many other vertebrate remains.

I. PTEROSAURIAN QUADRATE. (Fig. 2.)

The best example of the Pterosaurian quadrate bone is shown of three halves the natural size from the postero-internal aspect in the accompanying fig. 2, and the drawings above and below (figs. 2 *a*, *b*) represent the fractured surface and the articular face respectively. The element pertains to the left side and exhibits the large internal facette (*f*) for the articulation of the hinder pterygoid lamina; while the postero-external margin of the bone is acutely angulated. The ginglymoid articular end displays its characteristic obliquity, and the broken transverse section shows no trace of an internal cavity.

The fossil thus described seems to be most nearly paralleled, both in form and size, by a quadrate bone from the Kim-

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† Ann. & Mag. Nat. Hist. [6] vol. ii. (1888) pp. 132-136.

meridge Clay of Dorsetshire provisionally assigned by Mr. Lydekker to *Rhamphorhynchus Manseli*\*. The second specimen is also of the same character, but evidently pertains to a slightly larger animal. At present, however, the evidence

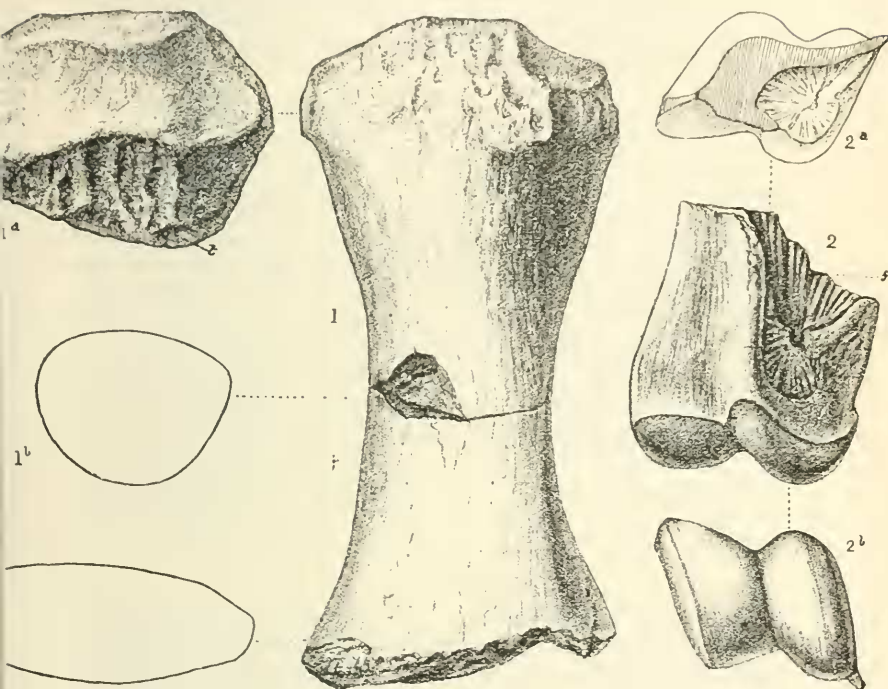


Fig. 1.—Dorsal aspect of left propodial bone (? humerus) of a Plesiosaurian, two thirds nat. size. 1 *a*. View of proximal end, with tuberosity (*t*). 1 *b*, *c*. Transverse sections.

Fig. 2.—Articular portion of left quadrate bone of a Pterosaurian, postero-internal aspect,  $\frac{2}{3}$  nat. size. 2 *a*. Upper view (fractured surface). 2 *b*. Articular end.

Both specimens from the Upper Cretaceous of Bahia, Brazil; in the British Museum.

is insufficient for the determination either of the genus or species; and for this purpose further discoveries must be awaited.

One of the specimens was found between Plataforma and

\* Quart. Journ. Geol. Soc. vol. xlvii. (1891) p. 41, pl. v. figs. 3, 4.

Itacaranha, and the other was obtained either from this beach or from Pedra Furada Bay (Montserrat). It is interesting to add that in the same formation and localities Mr. Mawson has detected fragments of delicate limb-bones, which he considers may also have belonged to a Pterosaurian; and it is hoped that before long an examination of some of these will lead to a more precise determination of the animal.

## II. PLESIOSAURIAN PROPEDIUM. (Fig. 1.)

The fossil readily recognizable as a Plesiosaurian propodial bone (humerus or femur) has lost the expanded distal extremity, but is otherwise well preserved. It is shown of two thirds the natural size, from the dorsal aspect, in fig. 1, and a view of the proximal end, a mesial transverse section, and a distal transverse section are given respectively in figs. 1*a-c*. The proximal end is very robust and coarsely rugose, with much greater breadth than thickness, and an only slightly differentiated tuberosity (*t*). The epiphyses are so firmly ankylosed with the shaft as not to be distinguishable; and the shaft itself is smooth and rounded, exhibiting only one longitudinal angulation in its middle portion on the inner side.

The bone thus described may probably be regarded as the left humerus of a typical marine Plesiosaurian; but beyond that suggestion it seems as yet impossible to proceed.

As already remarked, the interest of these new fossils from Bahia consists chiefly in their extending the known geographical range of two great extinct orders of reptiles. So far as the writer is aware, the only Mesozoic Reptilian remains hitherto recorded from South America are: (i.) a Plesiosaurian vertebra from the supposed Cretaceous of San Vicente, near Concepcion, Chili\*; (ii.) Crocodilian vertebræ from Juntas, in the valley of the Copiapo, Argentine Republic †; (iii.) numerous parts of a Cretaceous crocodile, *Hyposaurus derbianus*, from Pernambuco and Bahia, Brazil ‡; and (iv.) large Dinosaurian bones from the Cretaceous of Limay and

\* *Plesiosaurus chilensis*, Gay, Hist. fis. y polit. Chile, Zool. vol. ii. (1848) p. 133; *Cimoliosaurus chilensis*, Lydekker, Cat. Foss. Rept. B. M. pt. ii. (1889) p. 222.

† H. Burmeister, Abhandl. naturf. Ges. Halle, vol. vi. p. 122, pl. i. figs. 1-3.

‡ E. D. Cope, Proc. Amer. Phil. Soc. vol. xxiii. (1886) p. 15; R. Lydekker, Cat. Foss. Rept. B. M. pt. i. (1888) p. 91. Figures of teeth and a vertebral centrum are also given by S. Allport, Quart. Journ. Geol. Soc. vol. xvi. (1860) pls. xvi., xvii.

Neuquen, Patagonia\*. Mr. Mawson's discovery of the Pterodactyl seems to be the first of the kind in the Southern Hemisphere; that of the Plesiosaur adds another important locality to the known distribution of an order that has an equally wide geographical range in both Hemispheres.

XLII.—*Notes on African Mollusca*. By EDGAR A. SMITH.

I. *UNIONIDÆ* OF SOUTH AFRICA.

At present nine species of this family have been described from the southern extremity of the African continent, namely seven so-called species of the genus *Unio* and two species of *Mutela*. Five, if not six, of the forms of *Unio* really belong, I believe, to one and the same species. They have been separated on account of slight differences of form and sculpture, which, when a large series of specimens is examined, prove to be very unreliable and inconstant. Intermediate forms both in respect of outline and sculpture are met with, showing that the separation of these various forms cannot be maintained. The synonymy is as follows:—

1. *Unio caffer*, Krauss.

1848. *Unio caffer*, Krauss, Südafr. Moll. p. 18, pl. i. fig. 14.  
 1856. *Unio caffer*, Küster, Conch.-Cab. p. 143, pl. xlii. figs. 2, 3.  
 1866. *Unio caffer*, Sowerby, Conch. Icon. pl. xli. fig. 226.  
 1850. *Unio Verreauxianus*, Lea, Proc. Acad. Nat. Sci. Philad. vol. viii. p. 94.  
 1858. *Unio Verreauxianus*, id. Journ. Acad. Nat. Sci. Philad. vol. iii. p. 301, pl. xvii. fig. 16.  
 1868. *Unio Verreauxianus*, Sowerby, l. c. pl. lxix. fig. 352.  
 1850. *Unio africanus*, Lea, Proc. Acad. Nat. Sci. Philad. vol. viii. p. 94.  
 1858. *Unio africanus*, id. Journal, vol. iii. p. 300, pl. xxvii. fig. 15.  
 1865. *Unio africanus*, Sowerby, l. c. pl. xxii. fig. 100 (wrong locality given).  
 1864. *Unio natalensis*, Lea, Proc. Ac. N. Sci. Phil. vol. xxii. p. 113.  
 1866. *Unio natalensis*, id. Journal, vol. vi. p. 59, pl. xx. fig. 57.  
 1868. *Unio natalensis*, Sowerby, l. c. pl. lxxi. fig. 362.  
 1885. *Unio vaalensis*, Chaper, Bull. Soc. Zool. France, vol. x. p. 480, pl. xi. figs. 1-3.

*Hab.* Rivers of Natal and Cape Colony.

This species has the surface ornamented with concentric

\* F. P. Moreno, "Le Musée de La Plata" (in 'Revista de Museo de la Plata,' vol. i., 1890), p. 18.